

CLAIMS

1. A perimeter frame attached to a perimeter of a substrate on one of a perimeter-side and a die-side of the substrate, the perimeter frame arranged to provide an electrical function to the substrate.

2. A frame as claimed in claim 1, in which the electrical function being one of ground, power, and capacitance.

3. A frame as claimed in claim 1, the frame being attached in multiple parts.

4. A frame as claimed in claim 1, in which the substrate is one of a thick-core, a thin-core, and a coreless substrate in one of a ceramic, a flex, and an integrated circuit printed circuit board (IC-PCB) carrier package.

5. A frame as claimed in claim 4, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

6. A frame as claimed in claim 4, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

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7. A frame as claimed in claim 1, the frame substantially made of one of electrically conductive, insulating, and electrically conductive and insulating sections, and formed as one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

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8. A frame as claimed in claim 7, the sections further being thermally conductive.

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9. A frame as claimed in claim 8, the frame being adapted to at least partially support a heat sink.

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10. A frame as claimed in claim 8, the frame having an integrated cooling structure.

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11. A stiffener frame attached to a perimeter of a substrate on one of a perimeter-side and die-side of the substrate, the stiffener providing double electrical function to the substrate.

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12. A frame as claimed in claim 11, in which the double electrical function being ones of ground, power, and capacitance.

13. A frame as claimed in claim 11, the frame being attached in multiple parts.

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14. A frame as claimed in claim 11, the substrate being one of a thin-core, and a coreless substrate of a ceramic, a flex, and an integrated circuit printed circuit board (IC-PCB) carrier package.

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5 15. A frame as claimed in claim 14, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

10 16. A frame as claimed in claim 14, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

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15 17. A frame as claimed in claim 11, the frame substantially made of one of electrically conductive, insulating, and mixed electrically conductive and insulating sections, and formed as one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

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18. A frame as claimed in claim 17, the sections further being thermally conductive.

19. A frame as claimed in claim 17, the frame being adapted to at least partially support a heat sink.

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20. A frame as claimed in claim 17, the frame being having an integrated cooling structure.

21. A carrier package comprising

one of a thick, a thin-core, and a coreless substrate of one of a ceramic, a flex, and an integrated circuit printed circuit board (IC-PCB) package; and

a perimeter frame attached to a perimeter of the substrate on one of a perimeter-side and a die-side of the substrate, the perimeter frame arranged to provide an electrical function to the substrate.

22. A carrier package as claimed in claim 21, in which the electrical function being one of

10 ground, power, and capacitance.

23. A carrier package as claimed in claim 21, the frame being attached in multiple parts.

24. A carrier package as claimed in claim 21, the package being one of a pinned grid array

(PGA), and a ball grid array (BGA) carrier package.

25. A carrier package as claimed in claim 21, the package being one of a flip chip pin grid

array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

26. A carrier package as claimed in claim 21, the frame substantially made of one of an

electrically conductive, insulating, and electrically conductive and insulating sections, and formed as

one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

5 27. A carrier package as claimed in claim 26, the sections further being thermally  
conductive.

28. A carrier package as claimed in claim 26, the frame being adapted to at least partially support a heat sink.

10 29. A carrier package as claimed in claim 26, the frame having an integrated cooling structure.

15 30. A carrier package comprising:  
one of a thin-core, and a coreless substrate of one of a ceramic, a flex, and an IC-PCB package; and  
a stiffener frame attached to a perimeter of the substrate on one of a perimeter-side and die side of the substrate, the stiffener providing double electrical function to the substrate.

20 31. A carrier package as claimed in claim 30, in which the double electrical function being ones of ground, power, and capacitance.

32. A carrier package as claimed in claim 30, the frame being attached in multiple parts.

33. A carrier package as claimed in claim 30, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

34. A carrier package as claimed in claim 30, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

35. A carrier package as claimed in claim 30, the frame substantially made of one of an electrically conductive, insulating, and electrically conductive and insulating sections, and formed as one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

36. A carrier package as claimed in claim 35, the sections further being thermally conductive.

37. A carrier package as claimed in claim 35, the frame being adapted to at least partially support a heat sink.

38. A carrier package as claimed in claim 35, the frame having an integrated cooling structure.

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39. A packaged integrated circuit (IC) comprising:  
one of a ceramic, flex, and an integrated circuit printed circuit board (IC-PCB) carrier  
package including one of a thick, thin-core, and coreless substrate; and  
5 a perimeter frame attached to a perimeter of the substrate on one of a perimeter-side and a  
die-side of the substrate, the perimeter frame arranged to provide an electrical function to the  
substrate.

40. A packaged IC as claimed in claim 39, in which the electrical function being one of  
10 ground, power, and capacitance.

41. A packaged IC as claimed in claim 39, the frame being attached in multiple parts.

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42. A packaged IC as claimed in claim 39, the package being one of a pinned grid array  
15 (PGA), and a ball grid array (BGA) carrier package.

43. A packaged IC as claimed in claim 39, the package being one of a flip chip pin grid array  
(FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

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20 44. A packaged IC as claimed in claims 39, the frame substantially made of one of an  
electrically conductive, insulating, and electrically conductive and insulating sections, and formed as

one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

45. A packaged IC as claimed in claim 44, the sections further being thermally conductive.

46. A packaged IC as claimed in claim 44, the frame being adapted to at least partially support a heat sink.

47. A packaged IC as claimed in claim 44, the frame having an integrated cooling structure.

48. A packaged integrated circuit (IC) comprising:

one of a ceramic, flex, and an integrated circuit printed circuit board (IC-PCB) carrier package including one of a thick, thin-core, and coreless substrate; and

a stiffener frame attached to a perimeter of a substrate on one of a perimeter-side and die-side of the substrate, the stiffener providing double electrical function to the substrate.

49. A packaged IC as claimed in claim 48, in which the double electrical function being ones of ground, power, and capacitance.

50. A packaged IC as claimed in claim 48, the frame being attached in multiple parts.



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51. A packaged IC as claimed in claim 48, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

52. An packaged IC as claimed in claim 48, the package being one of a flip chip pin grid  
5 array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

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53. A packaged IC as claimed in claim 48, the frame substantially made of an electrically  
conductive, insulating, and electrically conductive and insulating sections, and formed as one of a  
molded, stamped, etched, extruded and deposited frame, and is capable of withstanding  
10 temperatures of at least normal IC operation.

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54. An packaged IC as claimed in claim 53, the sections further being thermally conductive.

55. A packaged IC as claimed in claim 53, the frame being adapted to at least partially  
15 support a heat sink.

56. A packaged IC as claimed in claim 53, the frame having an integrated cooling structure.

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57. A method for providing electrical function from a perimeter side of a substrate to a die-  
20 side of a substrate, which comprises:

(a) providing external power to perimeter frame attached to perimeter of a substrate,

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(b) conducting electrical function from perimeter frame, through perimeter frame-substrate interface, through substrate, through substrate-die interface, to die.

58. A method as claimed in claim 57, where electrical function further comprises one of  
5 power and ground.

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59. A method as claimed in claim 57, where perimeter frame also provides stiffening support.

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60. A method for providing power from perimeter side of a substrate to a die-side of a substrate, which comprises:

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- (a) providing perimeter frame capacitance attached to perimeter of a substrate,
  - (b) conducting power from perimeter frame capacitance, through perimeter frame substrate interface, through substrate, through substrate-die interface, to die.

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61. A method as claimed in claim 60, where electrical function further comprises one of power and ground

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20 62. A method as claimed in claim 60, where perimeter frame capacitance also provides stiffening support.